

- 15 -

Claims

1. A method to produce a perforated web material, wherein the web material (N) is fed through a nip (11) between a first roller (7) and a second roller (9) rotating in opposite directions and pressed against each other, the first roller (7) being provided with protuberances (7P) for perforation, **characterized in that** the web material is heated before being fed into said nip.

2. Method as claimed in claim 1, characterized in that at least one of said first and second roller (7, 9) is heated.

10 3. Method as claimed in claim 1 or 2, characterized in that said first and said second roller rotate with a different peripheral speed to each other.

4. Method as claimed in claim 3, characterized in that said first roller (7) rotates at a higher peripheral speed than said second roller (9).

15 5. Method as claimed in one or more of the previous claims, characterized in that said web material is a nonwoven fabric.

6. Method as claimed in claim 5, characterized by:

- producing at least a web of fibres (V);
- bonding said fibres to form a nonwoven fabric;
- feeding the preheated nonwoven fabric into said nip (11).

20 7. Method as claimed in claim 6, characterized in that said web (V) is produced and bonded in series upstream of said nip.

8. Method as claimed in claim 6 or 7, characterized by the phases of:

- producing at least a web of unbonded fibres (V);
- 25 • feeding said web of unbonded fibres (V) through at least a heating and bonding station to bond said fibres and form a nonwoven fabric;
- feeding the nonwoven fabric preheated in said at least a heating and bonding station into said nip (11).

30 9. Method as claimed in claim 8, characterized in that heating and bonding are performed using an air-through system.

10. Method as claimed in one or more of the claims from 6 to 9, characterized in that the nonwoven fabric is fed into said nip with an input

- 16 -

speed equal to or lower than the peripheral speed of the first roller (7).

11. Method as claimed in claim 12, characterized in that said second roller (9) is rotated at a peripheral speed lower than or equal to the peripheral speed of said first roller.

5 12. Method as claimed in claim 10 or 11, characterized in that the feed speed of the nonwoven fabric into said nip is between 90% and 100% of the peripheral speed of the first roller (7).

13. Method as claimed in claim 12, characterized in that the feed speed of the nonwoven fabric into said nip is between 90% and 110% of the peripheral speed of the second roller (9).

14. Method as claimed in claim 12 or 13, characterized in that the peripheral speed of the second roller (9) is between 50% and 100% of the peripheral speed of the first roller (7).

15. Method as claimed in claim 5, characterized by the phases of:

- 15 ◦ producing at least a web of unbonded fibres (V);
- feeding said web of unbonded fibres to a heating station (3);
- feeding the web of fibres preheated in said heating station into said nip (11);
- bonding the fibres to form the nonwoven fabric and perforating the web of fibres in said nip (11).

16. Method as claimed in claim 15, characterized in that the web of unbonded fibres (V) is fed into said nip with an input speed lower than the peripheral speed of the first roller (7), said peripheral speed of the first roller being equal to or higher than the peripheral speed of the second roller (9).

25 17. Method as claimed in claim 16, characterized in that a delivery speed equal to or higher than the peripheral speed of the first roller is imparted to the web material delivered from said nip.

18. Method as claimed in claim 16 or 17, characterized in that the feed speed of the web of fibres into said nip is between 50% and 90% of the peripheral speed of the first roller.

30 19. Method as claimed in one or more of the claims from 5 to 18, characterized in that two or more web of fibres (V1, V2) are coupled and

- 17 -

joined together.

20. Method as claimed in claim 19, characterized by: forming at least a first and a second web of unbonded fibres (V1, V2); joining said first and said second web together and consolidating said fibres in said heating station.

21. Method as claimed in claim 19, characterized by:

- forming at least a first and a second web of unbonded fibres; feeding said first and second web of unbonded fibres to one or two heating and bonding stations for preheating and separately bonding the fibres of the first and of the second web to form two nonwoven fabrics;
- feeding said two preheated nonwoven fabrics into said nip;
- perforating and joining together said two nonwoven fabrics in said nip.

22. Method as claimed in one or more of the claims from 5 to 21, characterized in that said web material comprises bicomponent fibres.

23. Method as claimed in one or more of the claims from 5 to 23, characterized in that a plastic film (Fp) is combined with said nonwoven fabric or with said web of unconsolidated fibres.

24. Method as claimed in one or more of the claims from 1 to 5, characterized in that said web material comprises at least a plastic film (Fp).

25. A production line to produce a perforated web material, comprising at least a path to feed a web material (V, V1, V2, Fp) to a perforation station (7, 9) comprising a first roller (7) and a second roller (9) rotating in opposite directions and pressed against each other, defining a nip (11) through which the web material is fed; the first roller (7) being provided with protuberances (7P) for perforation; **characterized in that** a heating station (3) is provided upstream of said perforation station, through which said feed path passes and in which the web material is preheated before being fed to said perforation station.

26. Production line as claimed in claim 25, characterized in that at least one of the rollers of the perforation station is heated.

27. Production line as claimed in claim 25 or 26, characterized in that the two rollers of the perforation station are controlled so that they rotate

- 18 -

at different peripheral speeds from each other.

28. Production line as claimed in claim 27, characterized in that said first roller (7) rotates at a peripheral speed higher than the peripheral speed of said second roller (9).

5           29. Production line as claimed in one or more of the claims from 25 to 28, characterized in that bonding devices are provided along said feed path to bond the fibres of a web of unbonded fibres and form a nonwoven fabric, which is fed to said perforation station.

10           30. Production line as claimed in claim 29, characterized in that said bonding devices comprise a bonding system of the air-through type.

31. Production line as claimed in one or more of the claims from 25 to 30, characterized in that it comprises at least a machine (1; 1A, 1B) to produce a web of fibres (V; V1, V2).

15           32. Production line as claimed in one or more of the claims from 25 to 30, characterized in that it comprises joining devices to join together two or more layers destined to form said web material.

33. Production line as claimed in claim 32, characterized in that said joining devices comprise means to consolidate two webs of fibres to each other.

20           34. Production line as claimed in one or more of the claims from 25 to 33, characterized in that it comprises two feed paths for at least two components destined to form said web material, said two feed paths uniting before passing through said perforation station.